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ABSTRACT

The purpose of this study was to determine the effects of contextual knowledge on comprehension and retention of text material. The subjects were 144 high school students randomly assigned to experimental conditions. The subjects were provided with different types of information about the theme and context of various prose passages, and predictions were made as to the relative effectiveness of the different types of contextual information. This information was provided in either verbal or pictorial form, with both concrete and abstract forms of each used. The subjects received this information either before or immediately after reading short prose passages which were also highly abstract or highly concrete. The retention measures were total words recalled, total words recalled in order, idea units correctly recalled, and types of intrusions produced. The results indicated that subjects receiving pictorial organizers recalled more than those receiving verbal organizers, recall was greater for concrete paragraphs than for abstract paragraphs, and knowledge of the theme and context of a particular passage was shown to be critical for comprehension. (WR)

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Effects of Contextual Knowledge on Comprehension and Retention of Text Material

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Recent literature indicates that linguistic processing and comprehension are not self-contained or isolated phenomena. Rather, it appears that certain extralinguistic information or knowledge structures are necessary for adequate and meaningful processing of linguistic input (Haviland & Clark, 1974; Bransford & Johnson, 1973). For example, Bransford and Franks (1971) have shown that input sentences may be integrated with previous knowledge to yield semantic products specifying more information than was actually expressed in the input. Furthermore, Bransford and Johnson (1972) propose that certain types of knowledge may actually constitute "semantic prerequisites" for comprehension of verbal materials. According to this view, a critical part of the comprehension process involves relating input information to relevant aspects of prior knowledge.

In the present study, subjects were provided with different types of information about the theme and context of various prose passages, and predictions were made as to the relative effectiveness of the different types of contextual information. This information was provided in either verbal or pictorial form, with both concrete and abstract forms of each, used. Subjects received this information either before or immediately after reading short prose passages which were also highly abstract or highly concrete. If imagery is considered to be a powerful determinant of comprehension, then one would expect retention and recall for the respective organizer-passage combinations to be ordered along a continuum of concreteness (i.e., concrete-pictorial organizers with concrete passages to abstract-verbal organizers with abstract passages). If however, comprehension is a type of problem solving task in which the learner actively searches for a context within which he can relate information to relevant aspects of prior knowledge, different predictions arise. For example, since the appropriate contextual information should be present during the ongoing process of comprehension for maximum benefit (Bransford & Johnson, 1972), the recall performances of the organizer-before groups should exceed those of the organizer-after groups. Also, more facilitation should accrue to the abstract paragraphs since the concrete versions already contain a considerable number of concrete-semantic references (Bransford & Johnson, 1973; Haviland & Clark, 1974).

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Method

The design was a 2 Organizer Form (pictorial vs. Verbal) x 2 Organizer Type (Abstract vs. Concrete) x 2 Organizer Presentation (Before vs. After) x 2 Paragraph Construction (Abstract vs. Concrete) mixed analysis of variance with repeated measures on the Paragraph Construction variable. An independent control group receiving no organizers completed the design.

The subjects were 144 high school students from the Mesa Public School System. The subjects were randomly assigned, 16 to each condition, in order of their appearance for the experiment.

Concrete and abstract versions of four 70-word paragraphs were constructed by the author. A concrete paragraph was defined as providing a readily "picturable" image of the scene described, whereas the abstract paragraphs were developed to be relatively hard to picture or imagine (Paivio, 1971).

Rating data for abstractness-concreteness, synonymity, and number of idea units were obtained on each of the paragraph sets in the following manner: 120 high school students rated each paragraph (a) on a 7-point scale for abstractness-concreteness, (b) on a 7-point scale for high versus low synonymity, and (c) for the number of idea units contained in each.

Abstract and concrete types of verbal and pictorial contextual organizing information were constructed. Verbal information was presented in the form of a thematic title (Dooling & Lachman, 1971). Concrete verbal information provided subjects with knowledge of the passages' theme. Abstract verbal information provided partial reference to the passages' content. Similar manipulations were made with pictorial types of organizing information.

The subjects were tested in groups ranging from 10 to 20. Each subject was randomly given a treatment booklet containing four paragraphs and the contextual information appropriate to his condition. Instructions were the same for all experimental subjects. Each organizer was viewed for 5 seconds, and each paragraph for one minute.

Results and Discussion

Free recall protocols were analyzed using three dependent measures: total words recalled, number of idea units recalled, and the number of high-thematic intrusions produced (see Dooling & Mullet, 1973, for intrusion scoring procedures).

For total words recalled, the analysis of variance produced significant effects for Organizer Form, $F(1,120) = 4.28$, $p < .05$; and for Paragraph Construction, $F(1,120) = 41.42$, $p < .001$. Hence, subjects receiving pictorial organizers recalled significantly more words than did subjects in verbal organizer conditions. Also, significantly more words were recalled from concrete than abstract paragraphs.

The analysis of variance for the number of idea units recalled produced significant effects for Organizer Form, $F(1,120) = 21.04$, $p < .01$; and Paragraph Construction, $F(1,120) = 40.76$, $p < .001$. Thus, subjects receiving pictorial organizers recalled significantly more idea units than did subjects receiving verbal organizers. Again, significantly more idea units were recalled from concrete than abstract paragraphs.

In the idea unit analysis, the A x B interaction (Organizer Form x Organizer Type) also reached significance, $F(1,120) = 7.25$, $p < .01$ (see Figure 1). Tests of simple effects on the A x B means indicate that significant differences lie between abstract and concrete types of pictorial organizers, $F(1,120) = 8.71$, $p < .005$; and between abstract and concrete types of verbal organizers, $F(1,120) = 21.79$, $p < .001$. Tests of differences between control and experimental subjects indicate that significantly more idea units were recalled by experimental subjects receiving organizers of some type, $F(1,135) = 18.77$, $p < .001$.

For high-thematic intrusions the analysis of variance yielded significant effects for Organizer Form, $F(1,120) = 5.61$, $p < .025$; and for Paragraph Construction, $F(1,120) = 70.55$, $p < .001$. Hence, subjects receiving pictorial organizers produced significantly more high-thematic intrusions than did subjects receiving verbal organizers. Also, significantly more high-thematic intrusions were produced from concrete than abstract paragraphs.

In general, contextual organizing information facilitated recall of passage content. Also, the relative effectiveness of the contextual information was found to vary with the type and form of organizer presented. As Figure 1 graphically illustrates, a clear superiority existed for abstract versus concrete types of pictorial organizers. This effect defies notions based on the effectiveness of concrete visual imagery which would predict the highest recall from subjects receiving concrete-pictorial organizers. If however, one considers the learning task in terms of comprehension, explanations for this apparent discrepancy become clear. The abstract-pictorial organizers used in this study were constructed so as to provide subjects with only a partial and vague idea of what the passage concerned. Thus, subjects in these conditions were forced to make inferences regarding the nature and content of the passages, or to actively search for a context which could encompass the passage content. Therefore, subjects receiving such organizers were, by the nature of the task, required to activate more semantic information or antecedents in memory (Haviland & Clark, 1974), and to process more information from the passage more thoroughly as they actively searched for a situation that the passage might be about (Bransford & Johnson, 1973).

In summary, the data obtained are consistent with views claiming that subjects when confronted with a prose learning task, actively: search for a context that the passage may be about, and then store the meaning or gist of the passage. It appears that comprehension does involve a complex interrelation between input information and prior knowledge, and that contextual knowledge enabling subjects to activate appropriate semantic information already in memory has profound facilitative effects.

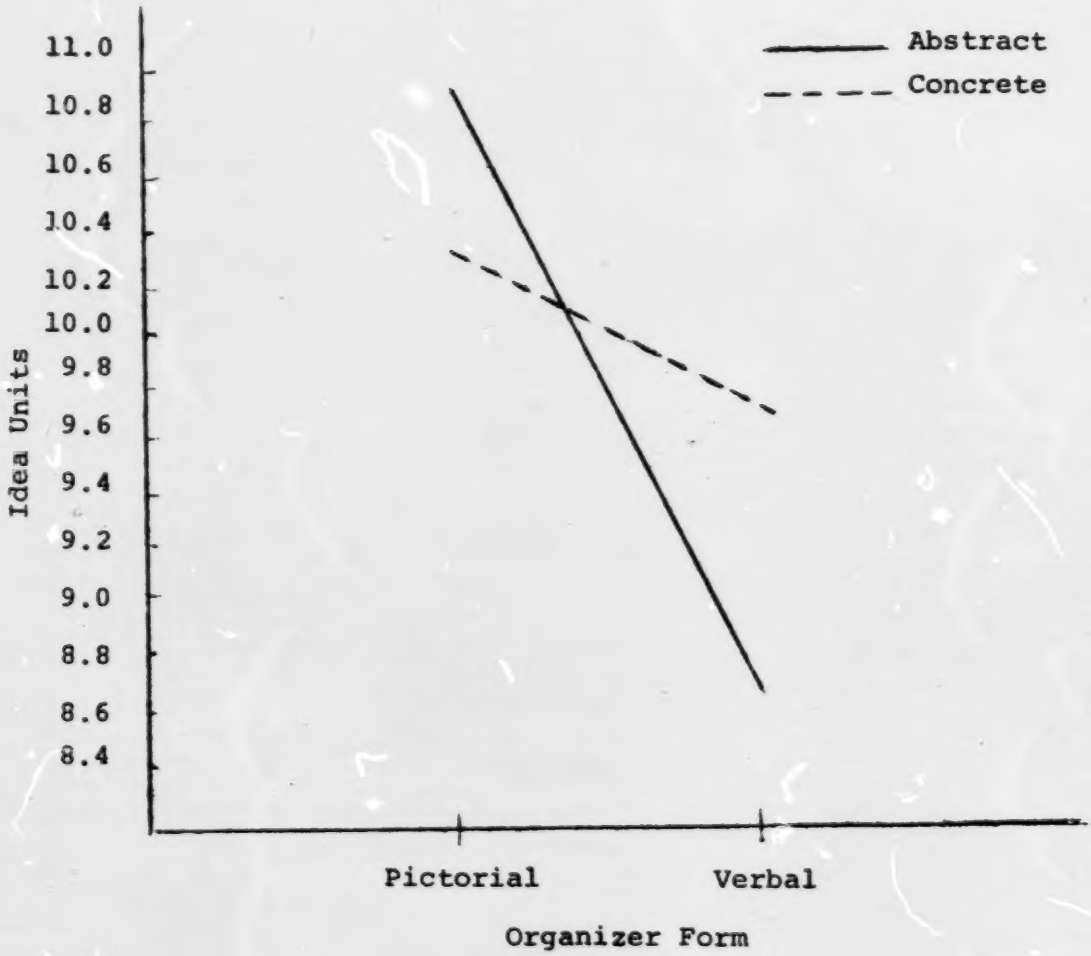

Fig. 1. Organizer Form x Organizer Type interaction for mean number of idea units recalled (n per cell = 32).